Name of Organization: Cleveland State University

Type of Organization: College or University

Contact Information: Dr. Tarun Mal

Dept. of Biological, Geological, and Environmental Sciences

2399 Euclid Avenue

Cleveland OH 44115

Phone: (216) 687 - 2444 **Extension:**

Fax: (216) 687 - 6972

E-Mail: t.mal@csuohio.edu

Project Title: Ecological impacts of invasive species

Project Category: Exotic Species

Rank by Organization (if applicable): 0

Total Funding Requested ($): 95,227 **Project Duration:** 2 Years

Abstract:

Invasive species often cause serious ecological damage. Lythrum salicaria (purple loosestrife) is an important invading and colonizing weed introduced to North America from Europe in the early 19th century. It forms extensive monocultures, excluding native wetland plant species, and is considered a major threat to our biodiversity. Lythrum salicaria is one of the most predominant invasive weeds in the Great Lakes Basin wetlands. To investigate the magnitude and nature of ecological impacts of L. salicaria, I propose to conduct a floristic survey of 45 wetland plant communities in the northeast Ohio representing different levels of infestation by L. salicaria, and disturbance regimes. I also intend to study temporal changes in the community structure due to invasions by L. salicaria in permanent plots in a subset of these communities. These observations will be complemented with a mesocosm experiment simulating native wetland communities and invasions by L. salicaria.

Geographic Areas Affected by the Project

States:

- [x] Illinois
- [x] Indiana
- [x] Michigan
- [x] Minnesota
- [x] New York
- [x] Pennsylvania
- [x] Wisconsin
- [x] Ohio

Lakes:

- [ ] Superior
- [ ] Huron
- [ ] Michigan
- [ ] Erie
- [ ] Ontario
- [x] All Lakes

Geographic Initiatives:

- [ ] Greater Chicago
- [x] NE Ohio
- [ ] NW Indiana
- [ ] SE Michigan
- [ ] Lake St. Clair

Primary Affected Area of Concern: Cuyahoga River, OH

Other Affected Areas of Concern: Ashtabula River, OH
Black River, OH

For Habitat Projects Only:

Primary Affected Biodiversity Investment Area: Western Lake Erie/Oak Openings

Other Affected Biodiversity Investment Areas:

Problem Statement:

Species invasion beyond their natural ranges can be ecologically as well as economically devastating. In the United States, the estimated economic loss from harmful non-indigenous species was approximately $100 billion by 1991, and the annual habitat loss was 190,000 hectares of wetland from one exotic species, L. salicaria alone. Anthropogenic biological invasion is the second major threat to the native biodiversity. It is imperative to understand the ecological impacts of invasive species on native communities in order to facilitate appropriate management practices. Lythrum salicaria forms extensive monocultures in the Great Lakes Basin eliminating native wetland species. This project seeks to understand how invasions of L. salicaria reduce native biodiversity, change plant community structure, and identify species and communities that are vulnerable to invasions.

Proposed Work Outcome:

Three approaches will be taken to understand the ecological impacts of Lythrum salicaria in the Great Lakes Basin: 1) A survey of 45 wetlands in the northeast Ohio will be conducted; 2) long-term permanent plots will be established for monitoring temporal changes in the community structure; and 3) a controlled mesocosm experiment simulating native wetland communities will be carried out to investigate invasion processes and to correlate experimental results with the observations from the survey of natural communities.

The survey of wetland communities will document the extent of an invasion by L. salicaria in the western Lake Erie Basin BIA. The survey will also help us determine the communities that are more invasible than others, and identify the major sources of disturbance that increase chances of successful establishment of L. salicaria in wetland communities. A species diversity index will be calculated for each of the 45 communities to identify which invaded communities are more seriously impacted by invasions. Through the permanent plot study and the mesocosm experiment, we will also be able to find out the causes of declining biodiversity following species invasions, mechanisms underlying invasion processes, and the ecological impacts of invasive species. Understanding invasion processes of L. salicaria will help us develop monitoring programs of wetland communities in the Great Lakes Basin, identify the threatened species and communities, and effectively manage this invasive weed and control its potential spread. The cost beyond the second year involved in the maintenance of permanent plots and mesocosm experiment, data collection and analysis will be requested from other federal funding agencies.

Project Milestones:	Dates:
Project Start	06/2000
Site inventory and selection	06/2000
Set up mesocosm experiment	07/2000
Survey of communties	08/2001
Set up permanent plots	07/2000
Data collection	09/2001
Data analysis and report preparation	04/2002
Project End	05/2002

☐ Project Addresses Environmental Justice

If So, Description of How:

☒ Project Addresses Education/Outreach

If So, Description of How:

Education is an integral component of the project. One graduate student and two undergraduate students will be trained in invasion ecology. The results of the project will be presented in local, national and international conferences to increase awareness about the impacts of invasive species. At least three papers are expected to be published in peer-reviewed scientific journals.

Project Budget:

	Federal Share Requested ($)	Applicant's Share ($)
Personnel:	47,886	16,368
Fringe:	4,076	4,010
Travel:	7,276	0
Equipment:	0	0
Supplies:	5,000	0
Contracts:	0	0
Construction:	0	0
Other:	1,300	11,348
Total Direct Costs:	65,538	31,726
Indirect Costs:	29,689	10,148
Total:	95,227	41,874
Projected Income:	0	0

Funding by Other Organizations (Names, Amounts, Description of Commitments):

Cleveland State University: Established Full-Time Faculty Research Development Program = $9,981.00

Description of Collaboration/Community Based Support:

The project will be carried out in collaboration with the Woodlake Environmental Field Station in the Cuyahoga Valley National Recreation Area (CVNRA). A letter of support will be submitted with the full proposal.